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Six new species of the genus *Nitela* Latreille (Hymenoptera, Crabronidae) from China, with a key to the Oriental species

Chengfang Li[1], Qiang Li[1], Li Ma[1]

1 *Department of Entomology, College of Plant Protection, Yunnan Agricultural University, Kunming, Yunnan, 650201, China*

Corresponding authors: Qiang Li (liqiangkm@126.com); Li Ma (maliwasps@aliyun.com)

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Abstract

This paper presents a systematic study on the Chinese species of the genus *Nitela*. Six new species from Yunnan, Hainan, and Guangdong Provinces are described: *Nitela carinifrons*, *Nitela noncrenulata*, *Nitela punctidorsalis*, *Nitela transcarinata*, *Nitela tumidiscuta*, and *Nitela vecarinata*. Diagnostic characters distinguishing these species from their congeners are provided. Additionally, three species are newly recorded from China: *Nitela rugosa* Williams, 1928, *Nitela williamsi* Menke, 1968 and Nitela domestica (Williams, 1928). A key to the Oriental species of the genus *Nitela* is provided.

Keywords

Digger wasp, key, Miscophini, new record, taxonomy

Introduction

The genus *Nitela* Latreille (Hymenoptera, Crabronidae, Crabroninae, Miscophini) was first established by Latreille in 1809, with Nitela *spinolae* as its type species. The genus currently comprises 66 recognized species and two subspecies, distributed across all six major zoogeographical regions. The majority of species occur in the Palearctic (15 species), Neotropical (16 species), and Oriental regions (13 species, one subspecies)

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(Latreille 1809; Kohl 1884; Ducke 1903, 1908; Brauns 1911; Turner 1916; Maidl 1925; Turner 1926; Williams 1928; Arnold 1940; Gussakovskij 1945; Tsuneki 1956, 1982; Menke 1968, 1969; Valkeila 1974; Lefeber 1975; Lomholdt 1975; Banaszak 1977; Haeseler 1978; Kazenas 1978; Jacob-Remacle and Leclercq 1980; Gayubo 1984; Lomholdt 1985; Vikberg 1986; Allen 1987; Tsuneki et al. 1992; van Zuijlen 1994; Shlyakhtenok 1996; Voblenko et al. 1996; Gayubo and Felton 2000; Ljubomirov 2008; Li and Li 2010; Pulawski 2010; Pankov 2013; Gayubo and Schmid-Egger 2014; Fresno 2018; Japoshvili and Ljubomirov 2022; Schmid-Egger and van Harten 2022; Kaplan and Yildirim 2023). A significant number of species are also found in the Afrotropical region (12 species, one subspecies) (Arnold 1929, 1947). Additionally, there are five species in each the Nearctic and Australasian regions (Turner 1908; Pate 1937; Williams 1945; Krombein 1950, 1968; Matthews 2000). In China, four species and one subspecies have been previously recorded (Li and Li 2010).

In this study, six new species of *Nitela* are described and illustrated, and three newly recorded species in China are reported. A key to the Oriental species of *Nitela* is also provided.

Materials and methods

The specimens examined during this study were collected from Yunnan, Guangdong and Hainan Provinces in China, and deposited in the Insect Collection of Yunnan Agricultural University, Kunming, P. R. China (YNAU). The specimens were observed and illustrated using an Olympus stereomicroscope (SZ Series) with an ocular micrometer. The photographs were taken with VHX-5000.

The abbreviations in the text are as follows: POD: postocellar distance, distance between inner margin of hind ocelli, dorsally; OOD: ocellocular distance, distance between outer margin of hind ocellus and nearest inner orbit, dorsally; ODD: the longest diameter of a lateral ocellus, dorsally.

Taxonomy

Genus *Nitela* Latreille, 1809

Nitela Latreille, 1809: 77. Type species: *Nitela spinolae* Latreille, 1809, by monotypy.
Tenila Brèthes, 1913: 153. Type species: *Nitela amazonica* Ducke, 1903, by original designation.
Rhinonitela Williams, 1928: 97. Type species: *Rhinonitela domestica* Williams, 1928, by original designation.

Diagnosis. Inner orbits of compound eyes converging dorsally toward midline. In some species, frons bordered by carina along inner orbit. Outer ventral margin of

mandible complete, mandibular socket closed. Median lobe of clypeus conspicuously raised from base to apex, with complete midclypeal carina that often connects to longitudinal carina of frons. Anterior margin of clypeus truncate or slightly emarginate medially, typically with smooth triangular area medially. Pronotum relatively long. Mesoscutum usually with carinae. Mesopleuron with hypersternaulus. Propodeum elongate, without bounding sulcus, often with longitudinal striae or reticulate sculpture. Forewing with one submarginal cell and one discoidal cell. Hindwing with jugal lobe, without closed cells. Metasoma without petiole (Bohart and Menke 1976).

Biology. *Nitela* Latreille, 1809, are predatory wasps that primarily hunt psocid (Psocoptera) larvae and also occasionally prey on aphids (Vincens 1910) and psyllids (Maneval 1929). During the provisioning period, the females paralyze their prey, grasp the base of the prey's antennae with their mandibles, and then transport it in flight to their nest, securing it beneath their body with their legs. *Nitela* typically nest in ready-made cavities, such as holes in wood, hollow stems, or plant stalks. Some females utilize beetle burrows in timber, hollow plant stems, or galls formed by cynipid wasps. The nest consists of one or more linearly arranged cells, with up to six cells reported. The partitions between cells are constructed from externally collected plant and mineral particles. The nest entrance is sealed with materials such as wood fragments, pebbles, sand, soil particles, leaf or stem fragments, and resin. Each cell contains 6–40 prey. The egg is laid on the ventral side of the last provisioned prey, between the coxae of the fore and middle legs (Ahrens 1949; Kazenas 2001).

Distribution. Widely distributed over the world.

Key to the Oriental species of the genus *Nitela* Latreille, 1809

(Males are unknown for *N. protuberancis* T. Li and Q. Li, 2010; *N. noncrenata* sp. nov.; *N. punctidorsalis* sp. nov.; *N. transcarinata* sp. nov.; *N. carinifrons* sp. nov.; *N. williamsi* Menke, 1968; *N. domestica* (Williams), 1928; *N. tumidiscuta* sp. nov.; *N. yasumatsui taiwana* Tsuneki, 1982; *N. vecarinata* sp. nov.; females are unknown for *N. obliquipropodea* T. Li and Q. Li, 2010).

1 Frons and clypeus covered with golden pubescence; legs largely ferruginous...**2**
– Frons and clypeus covered with silvery-white pubescence; leg almost black...**3**
2 Scutellum without a median transverse protuberance.....
.....***N. henrici* Turner, 1926**
– Scutellum with a median transverse protuberance.....
.....***N. protuberancis* T. Li & Q. Li, 2010**
3 Posterior margin of scutum with a transverse row of six conspicuous pits.....
.....***N. philippinica* Tsuneki et al., 1992**
– Posterior margin of scutum with short longitudinal ridges or a few inconspicuous pits 4
4 Anterior margin of mesoscutellum not crenulate..... ***N. noncrenata* sp. nov.**
– Anterior margin of mesoscutellum crenulate.....**5**

5 Pronotal collar rectangular with conspicuous anterior carina.....**6**
– Pronotal collar stepped, anterior carina inconspicuous or absent.....**10**
6 Mesoscutum with coarse reticulate ridges.....7
– Mesoscutum with conspicuous transverse ridges **8**
7 Ridges on propodeal dorsum reticulate; punctures on scutum conspicuous... .....***N. rugosa*** **Williams, 1928**
– Ridges on propodeal dorsum reticulate; punctures on scutum inconspicuous ..... ***N. apoensis*** **Tsuneki et al., 1921**
8 Frons and mesoscutum between ridges densely punctate; body length less than 4 mm.....***N. punctidorsalis*** **sp. nov.**
– Frons with coarsely reticulate ridges; mesoscutum between ridges dull or highly polished, impunctate or sparsely punctate; body length more than 4 mm.....**9**
9 Pronotal collar with longitudinal ridges within transverse groove; mesoscutum between ridges dull; scutal lateral sulcus conspicuously crenulate..... ..... ***N. collaris*** **Turner, 1926**
– Pronotal collar without longitudinal ridges within transverse groove; mesoscutum between ridges highly polished; scutal lateral sulcus inconspicuous.... .....***N. transcarinata*** **sp. nov.**
10 Frons with conspicuous, long, median carina extending from frontal prominence to anterior ocellus **11**
– Frons without median carina, finely punctate or coarsely rugose.....**13**
11 Frons with single median carina reaching anterior ocellus ....***N. carinifrons*** **sp. nov.**
– Frons with long, longitudinal, median carina bifurcating basally into two carinae extending toward anterior ocellus.....**12**
12 Frontal carinae extending beyond anterior margin of anterior ocellus and parallel; recurrent vein with stub of vein just before its junction with submarginal cell ..... ***N. williamsi*** **Menke, 1968**
– Frontal carinae not extending beyond anterior margin of anterior ocellus; recurrent vein without stub of vein just before its junction with submarginal cell.....***N. domestica*** **(Williams, 1928)**
13 Frons coarsely rugose, mesoscutellum with longitudinal striae or coriaceous. **14**
– Frons nearly smooth or finely punctate, mesoscutellum densely punctate .**17**
14 Pronotal collar with conspicuous median V-shaped projection anteriorly and with posterior emargination; frons and metanotum coriaceous **15**
– Pronotal collar without median V-shaped projection anteriorly; frons coarsely, finely rugose **16**
15 Propodeal dorsum with longitudinal ridges from base to apex; mesoscutellum without longitudinal ridges..... ***N. tumidiscuta*** **sp. nov.**
– Propodeal dorsum with oblique ridges from base to each side; mesoscutellum with longitudinal ridges .....***N. obliquipropodea*** **T. Li & Q. Li, 2010**

16 Mesoscutellum without longitudinal carina; propodeal dorsum with curved, oblique carinae, without conspicuous, short, transverse carinae..... ..... ***N. yasumatsui taiwana*** **Tsuneki, 1982**

– Mesoscutellum with slender longitudinal carinae; propodeal dorsum with straight, longitudinal carinae and conspicuous, short, transverse carinae..... ..... ***N. vecarinata*** **sp. nov.**

17 Mesoscutum with transverse ridges; mesoscutellum transversely wrinkled or finely punctate; clypeus somewhat rounded out, slightly emarginate medially..... **18**

– Mesoscutum without transverse ridges; mesoscutellum punctate; clypeus arched, very projected medially..... **19**

18 Mesoscutellum transversely wrinkled; antennal article 3 a little longer than 2, and 4 a little longer than 3..... ***N. luzonensis*** **Williams, 1928**

– Mesoscutellum rather smooth with fine punctures and traces of longitudinal striae; antennal article 2 and 3 subequal, 4 longer than either .... ***N. bicornis*** **Williams, 1928**

19 Posterior ocellus almost touching compound eye; body length 4 mm ....***N. pendleburyi*** **Turner, 1926**

– Posterior ocellus removed from compound eye by at least 1.5 × its diameter; body length 6 mm .....***N. maxima*** **Maidl, 1925**

Nitela carinifrons **sp. nov.**

https://zoobank.org/20DFF837-309C-4ACA-942B-D199EA6EEA57

Fig. 1

Type material. ***Holotype.*** ♀, **China** • **Guangdong**, Shenzhen, Shenzhen Fairy Lake Botanical Garden, 22.5775°N, 114.1825°E, 2020.III.31–IV.30, Jianwei Li collector.

Paratypes. • 3♀, same data as holotype; 4♀, same location as holotype, 2020.VI.3–29 (1♀), 2019.XII.7–I.6 (1♀), 2020.IV.30–VI.5 (1♀), 2020.X.31–XII.3(1♀), Jianwei Li collector; 2♀, Dongguan, Dongguan Botanical Garden, 22.9494°N, 113.7714°E, 2020.IV.30–VI.3, Fei Ye collector; • 2♀, Dongguan, Dongguan Yinping Mountain, 22.9139°N, 114.2156°E, 2020.VIII..30–X.5 (1♀), 2020.X.5–30 (1♀), Fei Ye collector; 5♀, Zhaoqing, Dinghu Mountain National Nature Reserve, 22.5775°N, 114.1825°E, 2021.IV.1–V.1 (2♀), 2021.V.10–25 (2♀), 2021.IX.19–X.9 (1♀), Longlong Chen collector.

Diagnosis. This species is similar to *N. bifida* Menke, 1969 in having convex portion of frons with median carina reaching anterior ocellus; inner orbit straight and converging above, and lateral ocellus almost touching inner orbit, but differs by the following characteristics (characters of *N. bifida* in parentheses): clypeal anterior margin evenly arched (clypeal anterior margin projecting); propodeal posterior surface without lamellate projections on lateral margin (propodeal posterior surface with lamellate projections); mesoscutum slightly shiny, densely, coarsely rugose (mesoscutum dull, densely finely punctate); pronotal lobe black (pronotal lobe yellow).

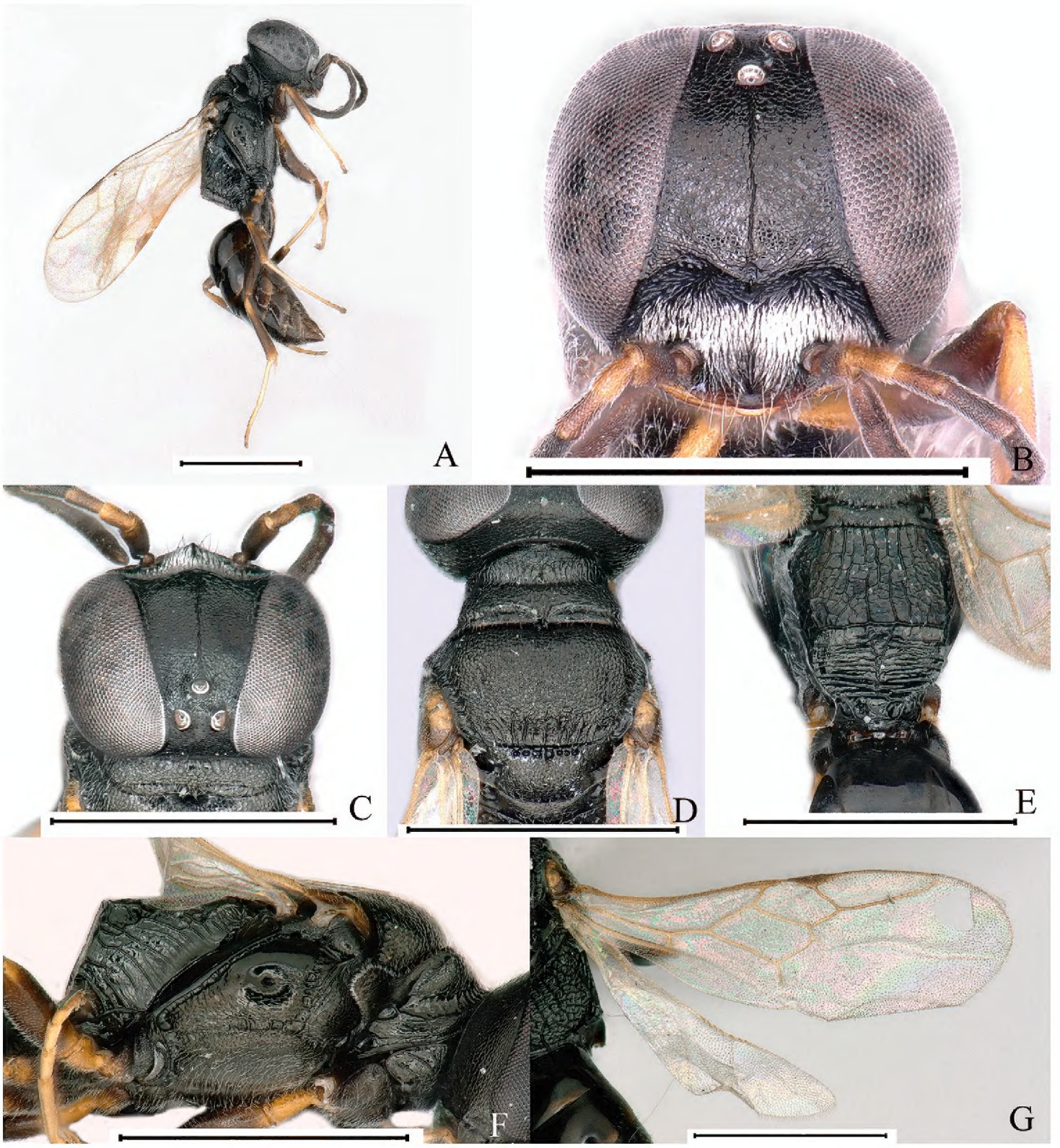

Figure 1. *Nitela carinifrons* sp. nov. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

Description of female. Body length 3.2–3.6 mm. Body black. Mandible basally dark brown, apex yellowish-brown; maxillary palpus and labial palpus mostly silvery. Scape and pedicel dark brown; stigma and tegula yellowish-brown; wing veins pale brown. Apical margin of gastral terga yellowish-brown. Trochanters and tibiae yellowish-brown, tarsi pale yellow; mid and hind coxae apically yellowish-brown. Body covered with silvery pubescence.

Head. Inner margin of mandible subapically with one tooth. Clypeus conspicuously convex medially; with complete midclypeal carina slightly surpassing frontoclypeal

sulcus; anterior margin of clypeus with triangular smooth area, truncate anteriorly (Fig. 1B). Frons coriaceous, densely punctate, swollen medially, depressed laterally; upper part of convex portion with median carina reaching anterior ocellus, laterally coriaceous up to carina; frontal concavity shallow (Fig. 1B). Ocellar triangle coriaceous (Fig. 1C). Gena and vertex finely coriaceous (Fig. 1C). Eyes converging above; OOD: POD: ODD = 1: 4: 4 (Fig. 1C). Flagellomere I approximately as long as pedicel.

Mesosoma. Pronotal collar stepped, with narrow transverse groove containing inconspicuous short longitudinal ridges, antero-lateral angle rounded; anterior carina conspicuous (Fig. 1D). Mesoscutum convex; basal median area with dense, small punctures; laterally with irregular, coarse coriaceous reticulation; posterior margin with row of short longitudinal ridges, between ridges dull; scutal lateral sulcus crenulate, with conspicuously defined inner margin, its internal transverse carinae connected to transverse carinae of scutellum (Fig. 1D). Mesoscutellum with median carina flanked by several fine curved rugae; anterior margin crenulate (Fig. 1D). Mesopleuron sparsely punctate except episcrobal area (Fig. 1F); episcrobal area and central circular depression smooth, polished; episternal sulcus crenulate, internal longitudinal ridges not exceeding border; hypersternaulus well-developed, broadened, shallowly crenulate (Fig. 1F). Mesosternum densely, finely punctate. Metanotum coriaceous. Metapleuron conspicuously separated from propodeal lateral surface; metapleuron smooth, without carina (Fig. 1F). Propodeal dorsum with conspicuous longitudinal ridges from base to apex, between ridges with inconspicuous, irregular, short transverse carinae forming reticulate pattern (Fig. 1E); posterior surface with median sulcus narrowing from base to apex, forming subtriangular zone; laterally to median sulcus with parallel regular, transverse ridges (Fig. 1E); lateral surface of propodeum with irregular, oblique carinae (Fig. 1F).

Wings. Recurrent vein with extremely short stub of vein just before its junction with submarginal cell (Fig. 1G).

Metasoma. Metasoma spindly; terga polished, with very sparse punctures. Sternum I with keeled projection, laterally to keel without conspicuous ridges. Basal third of sternum II with deep transverse groove, groove surface coriaceous.

Male. Unknown.

Distribution. China (Guangdong).

Etymology. The specific epithet *carinifrons* is derived from the Latin "*carina-*" and "*frons*", referring to the presence of a conspicuous median longitudinal carina on frons of this species.

Nitela noncrenulata sp. nov.

https://zoobank.org/12171365-42FC-4FF1-8626-BF5446C2859A

Fig. 2

Type material. ***Holotype.*** ♀, **China • Yunnan**, Xishuangbanna, Mengla Country, Xishuangbanna Tropical Botanical Garden, rubber plantation, 21.9197°N, 101.2778°E, 2021.I.15–II.17, Ling Zhao collector.

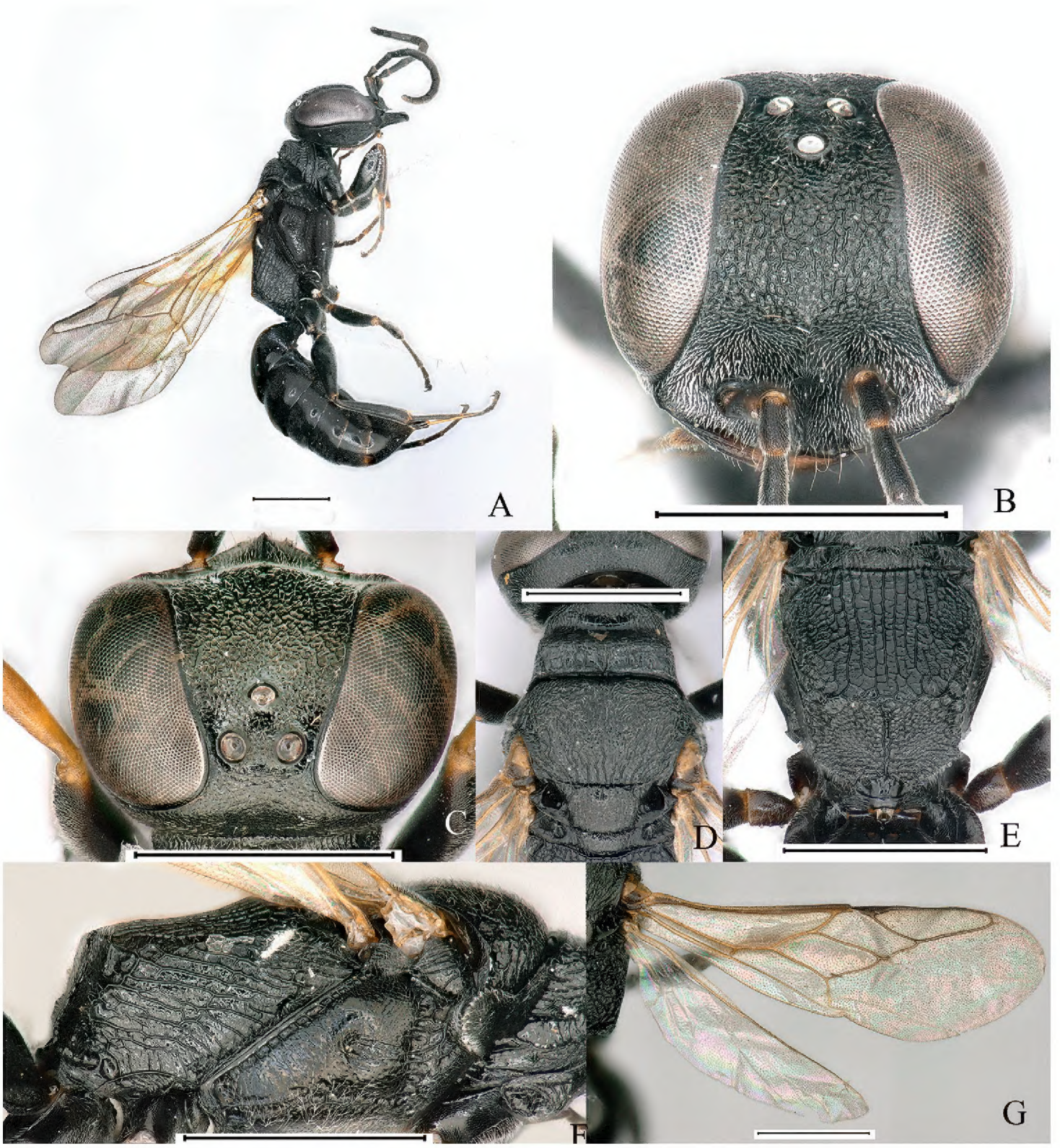

Figure 2. *Nitela noncrenulata* sp. nov. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

Paratypes. • 1♀, same data as holotype; 13♀, same location as holotype, 2021.II.17–III.16 (1♀), 2021.V.16–VI.19 (4♀), 2021.IV.11–V.16 (3♀), 2021.VIII.14–IX.15 (2♀), Ling Zhao collector; • 1♀, Xishuangbanna, Mengla Country, Xishuangbanna Tropical Botanical Garden, rainforest, 21.9200°N, 101.2300°E, 2021.V.16–VI.19, Ling Zhao collector; • 2♀, Xishuangbanna, Mengla Country, Xishuangbanna Tropical Botanical Garden, Tanyoulin, 21.9169°N, 101.2711°E 2021.II.17–III.16, Ling Zhao collector.

Diagnosis. The new species resembles *N. collaris* R. Turner, 1926 in having pronotal collar rectangular, with broad transverse groove containing sparse longitudinal ridges;

frons with coarsely, irregular, reticulate ridges. It differs by the following characteristics (characters of *N. collaris* in parentheses): gena with slender, transverse striations (gena densely punctate); vertex with irregular, transverse ridges (vertex densely punctate); anterior margin of mesoscutellum not crenulate (anterior margin of mesoscutellum deeply crenulate and widened); ventral half of mesopleuron without conspicuous oblique carina (ventral half of mesopleuron with several conspicuous oblique carinae). propodeal posterior surface with irregular, reticulate ridges forming large triangular area, flanked by sparse transverse ridges (propodeal posterior surface with dense transverse ridges).

Description of female. Body length 5.3–6.3 mm. Body black. Mandible basally dark brown, apex yellowish-brown. Maxillary palpus and labial palpus mostly yellowish-brown; stigma dark brown; wing veins, tegula, fore and mid tibiae and tarsi, basal quarter of hind tibia yellowish-brown; mid tibia sometimes with inner margin dark brown to black. Body covered with silvery pubescence.

Head. Inner margin of mandible subapically with one tooth. Clypeus conspicuously convex medially, with complete mid clypeal carina extending to basal area of frons, anterior margin of clypeus with triangular smooth area, slightly concave medially (Fig. 2B). Frons with coarse, irregularly reticulate ridges, swollen medially, depressed laterally, swelling with median carina, frontal concavity shallow (Fig. 2B). Vertex with irregular transverse ridges and shallow transverse groove behind posterior ocelli (Fig. 2C). Gena with long transverse striations. Eyes converging above; OOD: POD: ODD = 5: 6: 7 (Fig. 2C). Flagellomere I conspicuously shorter than pedicel.

Mesosoma. Pronotal collar rectangular, with broad transverse groove containing sparse longitudinal ridges, antero-lateral angle nearly rectangular; anterior carina conspicuous (Fig. 2D). Basal median area of mesoscutum with two short longitudinal ridges, basal two-thirds with irregular transverse ridges, between ridges with few inconspicuous, short, longitudinal ridges, posterior third with conspicuous, long, longitudinal wrinkles connected to ridges on median mesoscutum, inter-wrinkle areas densely punctate; scutal lateral sulcus crenulate, inner margin sharply defined, internal transverse ridges not extending beyond border (Fig. 2D). Mesoscutellum densely, finely punctate; median longitudinal carina present, flanked by weak lateral longitudinal rugae; anterior margin not crenulate (Fig. 2D). Mesopleuron punctate; episcrobal area punctate; central circular depression with transverse carinae extending beyond its margin; episternal sulcus deeply crenulate, internal longitudinal ridges slightly exceeding lateral margin; hypersternaulus well-developed, broadened, weakly crenulate (Fig. 2F). Metanotum finely punctate; lateral surface with several conspicuous longitudinal rugae (Fig. 2D). Metapleuron not conspicuously separated from propodeal lateral surface; metapleuron with several longitudinal ridges (Fig. 2F). Propodeal dorsum surface with longitudinal carinae from base to apex, interconnected by short transverse carinae forming reticulate pattern (Fig. 2E); posterior surface with median sulcus narrowing from base to apex, lateral to sulcus with irregular reticulate ridges forming triangular zone, lateral posterior surface with sparsely transverse rugae (Fig. 2E); lateral surface of propodeum with parallel oblique carinae extending to metapleuron and connecting to its longitudinal ridges, internal oblique carinae with inconspicuous short ridges (Fig. 2F).

Wings. Recurrent vein without stub of vein just before its junction with submarginal cell (Fig. 2G).

Metasoma. Metasoma spindly; terga polished, terga I-II with finely punctures. Sternum I with a keeled projection, laterally to keel with several conspicuous ridges. Basal third of sternum II with deep transverse groove, groove surface coriaceous.

Male. Unknown.

Distribution. China (Yunnan).

Etymology. The specific epithet *noncrenulata* is derived from the Latin prefix "*non*" and "*crenulate*", referring to the anterior margin of the mesoscutellum being non-crenulate of this species.

***Nitela punctidorsalis* sp. nov.**

https://zoobank.org/BF05F1ED-5464-4A97-A707-2F868E1D81A7

Fig. 3

Type material. ***Holotype.*** ♀, China • **Guangdong**, Zhanjiang, Mangrove Nature Reserve, 21.6103°N, 109.7906°E, 2020.X.21–XI.18, Fei Ye collector.

Paratypes. • 3♀, same location as holotype, 2021.V.11–26, Fei Ye collector; 10♀, **Guangdong**, Guangzhou, Haitzu National Wetland Park, 23.0603°N, 113.3369°E, 2021.IV.26–V.11 (4♀), 2021.VI.10–25 (1♀) 2021.VI.25–VII.10 (2♀), 2023.VII.17–VIII.22 (3♀), Fei Ye collector; • 1♀, **Hainan**, Lingshui Country, Diaoluo Mountain, 19.0778°N, 109.4144°E, 2021.II.28–III.31, coll. Longlong Chen; • 1♀, Baisha Country, Nankai Township, Binlanglin, 19.0778°N, 109.4144°E, 2019.X.20–30, Longlong Chen collector.

Diagnosis. This species is similar to *N. ohgushii* Tsuneki, 1956 in having pronotal collar rectangular, with broad, transverse groove; antero-lateral angle approximately rectangular; posterior surface of propodeum with median sulcus narrowing from base to apex, forming triangular zone, internally rugose, lateral to sulcus with sparse, coarse striae. It differs by the following characteristics (characters of *N. ohgushii* in parentheses): frons and mesonotum densely punctate (frons and mesonotum sparsely punctate, intervals finely coriaceous); mesoscutellum not coriaceous, densely punctate (mesoscutellum finely coriaceous, impunctate); clypeus with median longitudinal carina extending to lower-frontal tubercle (clypeal median carina not continued to lower-frontal tubercle).

Description of female. Body length 4.3–4.9 mm. Body black. Mandible basally dark brown, apex yellowish-brown; maxillary palpus and labial palpus mostly yellowish-brown; stigma and tegula dark brown; wing veins yellowish-brown. Body covered with silvery pubescence.

Head. Inner margin of mandible subapically with one tooth. Clypeus slightly convex medially; with complete middle carina extending to frontal swelling; anterior margin of clypeus with triangular smooth area, slightly concave medially (Fig. 3B). Frons densely punctate, swollen medially, depressed laterally; convex portion laterally with dense transverse ridges; frontal concavity deep (Fig. 3B). Ocellar triangle area punctate (Fig. 3C). Gena densely punctate. Vertex with irregular transverse ridges and

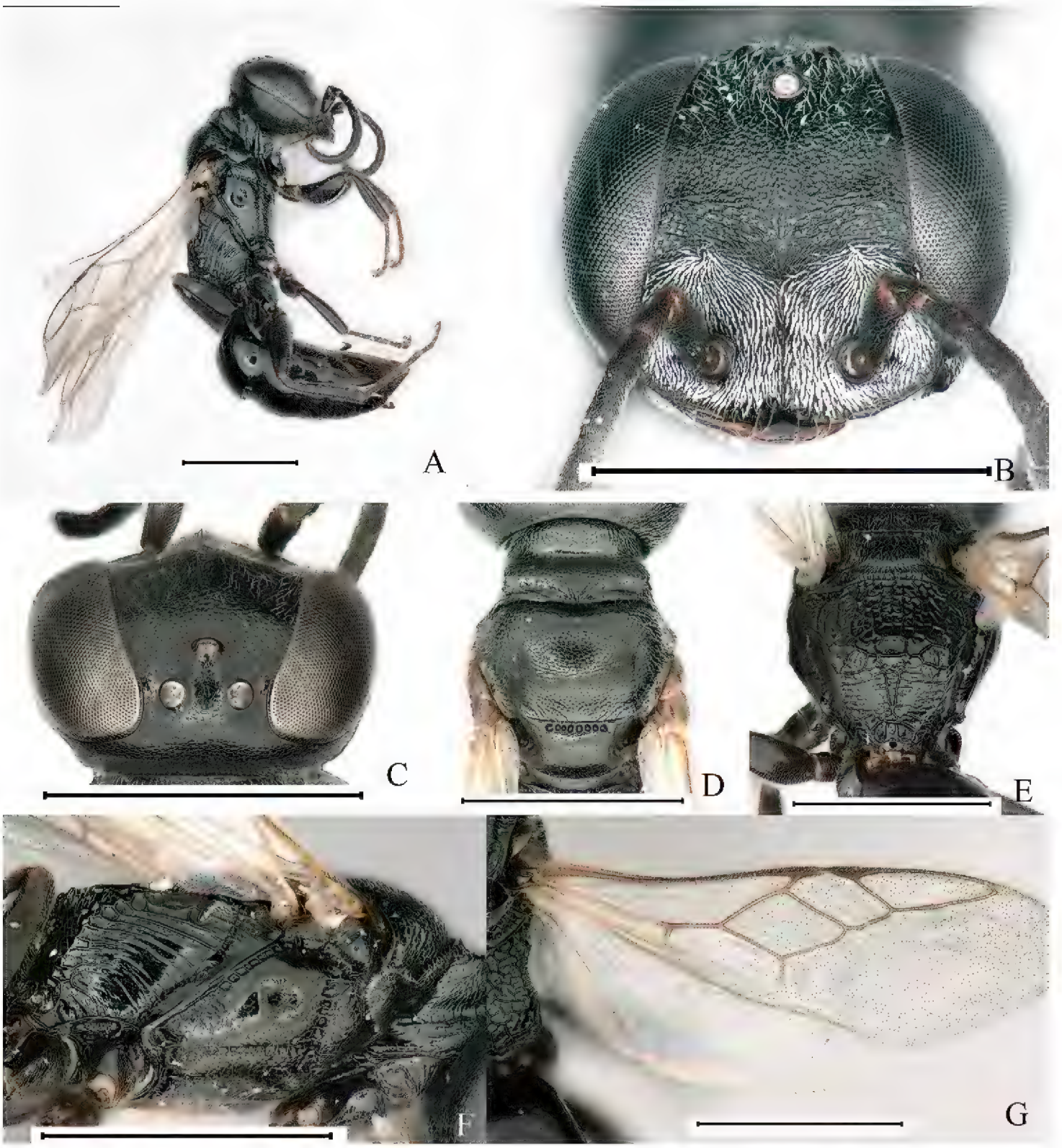

Figure 3. *Nitela punctidorsalis* sp. nov. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

punctures (Fig. 3C). Eyes converging above; OOD: POD: ODD = 4: 9: 5 (Fig. 3C). Flagellomere I conspicuously shorter than pedicel.

Mesosoma. Pronotal collar rectangular, with broad transverse groove; antero-lateral angle slightly rounded; anterior carina conspicuous (Fig. 3D). Basal median area of mesoscutum with two short longitudinal ridges; densely transverse ridges, between ridges areas punctate; posterior third with conspicuous, short, oblique, rugae; scutal lateral sulcus crenulate, inner margin slightly defined, internal transverse ridges extending beyond border (Fig. 3D). Mesoscutellum densely, finely punctate; without

longitudinal carina; anterior margin crenulate (Fig. 3D). Mesopleuron sparsely punctate except episcrobal area; smooth, polished; central circular depression punctate, area below depression punctate (Fig. 3F); episternal sulcus deeply crenulate, internal longitudinal ridges slightly exceeding lateral margin; hypersternaulus usual, inconspicuously crenulate (Fig. 3F). Mesosternum densely punctate. Metanotum finely punctate (Fig. 3D). Metapleuron conspicuously separated from propodeal lateral surface; dorsally with three inconspicuously longitudinal ridges (Fig. 3F). Propodeal dorsum with irregular, conspicuous reticulate ridges (Fig. 3E); posterior surface with median sulcus narrowing from base to apex, forming triangular zone, internally rugose; lateral to sulcus with sparse sturdy striae (Fig. 3E); lateral surface of propodeum with parallel oblique carinae, between carinae with inconspicuous, short ridges (Fig. 3F).

Wings. Recurrent vein without stub of vein just before its junction with submarginal cell (Fig. 3G).

Metasoma. Metasoma spindly; terga polished, terga I–II with sparse, fine punctures; tergum III and subsequent with dense, fine punctures. Sternum I with a keeled projection, laterally to keel with inconspicuous weak ridges. Basal third of sternum II with deep transverse groove, groove surface coriaceous.

Male. Unknown.

Distribution. China (Guangdong, Hainan).

Etymology. The specific epithet *punctidorsalis* is derived from the Latin stem "*punct*" and the Latin word "*dorsalis*", referring to the densely punctate mesoscutellum of this species.

Nitela transcarinata sp. nov.

https://zoobank.org/048C6511-F978-4A11-A0C4-0369842C89EB

Fig. 4

Type material. ***Holotype.*** ♀, China • **Guangdong**, Guangzhou, Haitzu National Wetland Park, 23.0603°N, 113.3369°E, 2021.V.24–VII.9, Fei Ye collector.

Paratypes. • 2♀, **Yunnan**, Jinghong, Menghai Country, Bulang Mountain, 21.6267°N, 100.4064°E, 2021.V.24–VII.9 (1♀), 2019.VII.19–VIII.21 (1♀), Ling Zhao collector; 1♀, Xishuangbanna, Mengla Country, Xishuangbanna Tropical Botanical Garden, rubber plantation, 21.9197°N, 101.2778°E, 2020.VIII.14–IX.15, Ling Zhao collector; • 1♀, **Hainan**, Lingshui Country, Diaoluo Mountain, 19.0778°N, 109.4144°E, 2020.IX.3–III.30, Longlong Chen collector; • 1♀, Baisha Country, Nankai Township, Binlanglin, 19.0778°N, 109.4144°E, 2019.X.20–30, Longlong Chen collector; • 1♀, Danzhou, Hainan Tropical Botanical Garden, Binlanglin, 19.5122°N, 109.5028°E, 2019.VIII.10–20, Longlong Chen collector.

Diagnosis. The new species resembles *N. collaris* R. Turner, 1926 in having frons with coarse, irregular reticulation; mesoscutum basal median area with two short longitudinal ridges, basal two-thirds with conspicuous, regular, transverse ridges. It can be readily distinguished from that species by the following characteristics

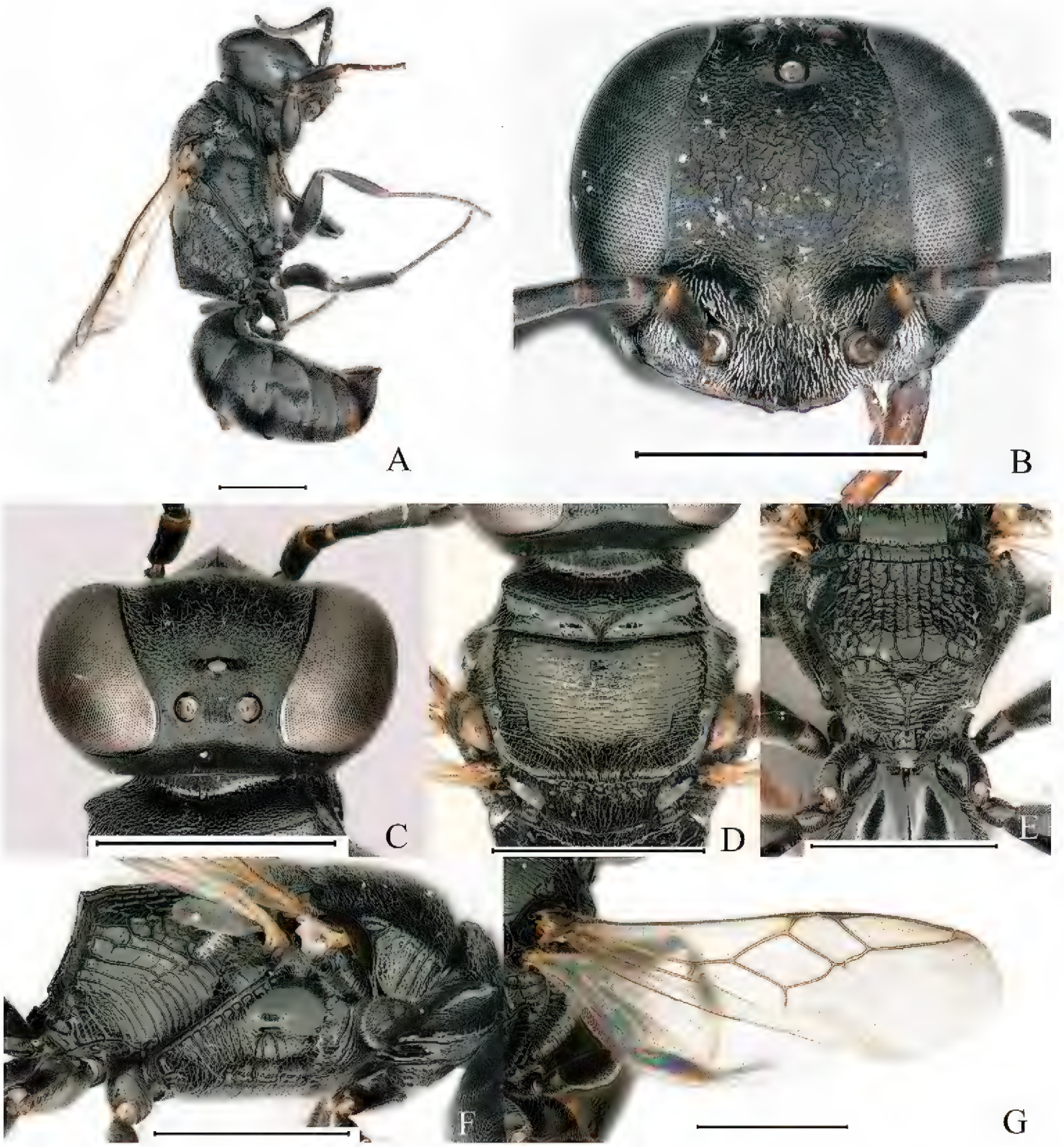

Figure 4. *Nitela transcarinata* sp. nov. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

(characters of *N. collaris* in parentheses): transverse groove of pronotal collar with conspicuous longitudinal ridges (transverse groove without any longitudinal ridges); mesoscutum between ridges highly polished, scutal lateral sulcus absent (mesoscutum between ridges dull, scutal lateral sulcus present and crenulate); ventral half of mesopleuron with parallel oblique ridges reaching mesopleural suture (ventral half of mesopleuron with non-parallel ridges not extending to mesopleural suture); propodeal dorsum with straight parallel longitudinal ridges from base to apex (propodeal dorsum with longitudinal ridges converging medially toward apex).

Description of female. Body length 5.4–5.9 mm. Body black. Mandible basally dark brown, apex yellowish-brown; maxillary palpus and labial palpus mostly yellowish-brown; stigma dark brown; wing veins yellowish-brown; tarsi blackish-brown; fore femur basally reddish-brown to black. Body covered with silvery pubescence.

Head. Inner margin of mandible subapically with one tooth. Clypeus conspicuously convex medially; with midclypeal carina extending from anterior margin to frontoclypeal suture; anterior margin of clypeus with triangular smooth area, slightly concave medially (Fig. 4B). Frons with coarse, irregular reticulation, swollen medially, depressed laterally; convex portion with median carina; frontal concavity very shallow (Fig. 4B). Ocellar triangle densely rugose. Gena densely finely punctate. Vertex finely punctate (Fig. 4C). Eyes converging above; OOD: POD: ODD = 4: 11: 7 (Fig. 4C). Flagellomere I conspicuously shorter than pedicel.

Mesosoma. Pronotal collar rectangular, with broad transverse groove and without any longitudinal ridge; antero-lateral angle nearly rectangular; anterior carina conspicuous (Fig. 4D). Basal median area of mesoscutum with two short longitudinal ridges; basal two-thirds with conspicuous, regular, transverse rugae, between rugae smooth, extremely finely punctate; posterior third with conspicuous, long, longitudinal wrinkles connected to median ridges, between wrinkles finely punctate; scutal lateral sulcus absent (Fig. 4D). Mesoscutellum densely punctate; median longitudinal carina present, lateral longitudinal carinae conspicuous; anterior margin crenulate (Fig. 4D). Mesopleuron densely, finely punctate except episcrobal area (Fig. 4F) coriaceous and densely punctate; central circular depression with longitudinal rugae; area below depression with conspicuous oblique ridges (Fig. 4F); episternal sulcus deeply crenulate, internal longitudinal ridges conspicuously exceeding lateral margin; hypersternaulus well-developed, deeply crenulate (Fig. 4F). Mesosternum densely, finely punctate. Metanotum finely punctate; laterally with several conspicuous longitudinal ridges (Fig. 4E). Metapleuron inconspicuously separated from propodeal lateral surface dorsally with oblique ridges (Fig. 4F). Propodeal dorsum with conspicuous, longitudinal ridges from base to apex, interconnected by conspicuous short transverse carinae forming reticulate pattern (Fig. 4E); posterior surface with median sulcus narrowing from base to apex, forming triangular zone with transverse ridges in its upper portion; posterior surface laterally with densely transverse ridges (Fig. 4E); lateral surface of propodeum with parallel oblique carinae, internal oblique carinae with inconspicuous, short ridges (Fig. 4F).

Wing. Recurrent vein with trace of vein stub just before its junction with submarginal cell (Fig. 4G).

Metasoma. Metasoma spindly; terga polished, terga I–II densely finely punctate; basal quarter of tergum II with several transverse ridges (sometimes absent); terga III and subsequent densely, finely punctate. Sternum I with keeled projection, laterally to keel with several conspicuous ridges. Basal third of sternum II with deep transverse groove, groove surface coriaceous.

Male. Unknown.

Distribution. China (Guangdong, Hainan, Yunnan).

Etymology. The specific epithet *transcarinata* is derived from the Latin "*trans-*" and "*carinata*", referring to the presence of transverse carinae on mesoscutum of this species.

***Nitela tumidiscuta* sp. nov.**
https://zoobank.org/DD62B4CC-5769-4496-B164-4FFF6FB3CEAB
Fig. 5

Type material. ***Holotype.*** ♀, **China** • **Yunnan,** Jinghong, Menghai Country, Bulang Mountain, 21.6267°N, 100.4064°E, 2018.VI.21–VII.20, Ling Zhao collector.

Paratypes. • 1♀, same data as holotype; 1♀, same location as holotype, 2019.V.28–VI.28, Ling Zhao collector; • 1♀, **Yunnan**, Jinghong, Menghai Country, Guanggang Village, 21.8192°N, 100.4967°E, 2021.II.14–III.14, Ling Zhao collector.

Diagnosis. This species is similar to *N. feltoni* Gayubo & Schmid-Egger, 2014 in having anterior carina of pronotal collar inconspicuous; episcrobal area coriaceous and impunctate; lower mesopleuron sparsely punctate. It differs by the following characteristics (characters of *N. feltoni* in parentheses): ventral half of mesopleuron without ridges (ventral half of mesopleuron with inconspicuous ridges); frons coriaceous, impunctate between lower part and midocellus (frons moderately shiny, sparsely, finely punctate and very finely ridged between lower part and midocellus); mesoscutum impunctate, mesosternum densely punctate (mesoscutum densely, finely punctate, mesosternum sparsely punctate and polished); clypeal anterior margin evenly arched (medial part of clypeal margin advanced, laterally with corners).

Description of female. Body length 3.6–3.9 mm. Body black. Mandible basally blackish-brown, apex dark brown; maxillary palpus and labial palpus mostly yellowish-brown; stigma and tegula blackish-brown; wing veins yellowish-brown. Tarsi dark brown. Body covered with silvery pubescence.

Head. Inner margin of mandible subapically with one tooth. Clypeus conspicuously convex medially, with midclypeal carina extending to frontal prominence; anterior margin of clypeus with triangular smooth area, slightly concave medially (Fig. 5B). Frons coriaceous, swollen medially, depressed laterally; upper part of convex portion with irregular sinuous rugae; frontal concavity shallow (Fig. 5B). Ocellar triangle densely coriaceous (Fig. 5C). Gena surface coriaceous. Vertex finely coriaceous (Fig. 5C). Eyes converging above; OOD: POD: ODD = 2: 5: 5 (Fig. 5C). Flagellomere 1 approximately as long as to pedicel.

Mesosoma. Pronotal collar stepped, with narrow transverse, but groove without internal ridges; anterolateral angle acute; anterior carina inconspicuous (Fig. 5D). Mesoscutum conspicuously convex, with dense, fine, irregular transverse striae; basal median area without short, longitudinal ridges, posterior third with coarse, irregular wrinkles connected to median ridges, between wrinkles dull; scutal lateral sulcus crenulate, inner margin sharply defined, internal transverse ridges not extending beyond border (Fig. 5D). Mesoscutellum coriaceous; anterior margin crenulate (Fig. 5D). Mesopleuron sparsely punctate except episcrobal area (Fig. 5F) coriaceous and impunctate; central circular depression coriaceous (Fig. 5F); episternal sulcus crenulate, broadened, internal longitudinal ridges conspicuously exceeding lateral margin; hypersternaulus inconspicuous crenulations faint (Fig. 5F). Mesosternum densely finely punctate. Metanotum finely coriaceous (Fig. 5D). Metapleuron conspicuously separated from propodeal lateral surface; dorsally smooth, without

Figure 5. *Nitela tumidiscuta* sp. nov. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

ridges (Fig. 5F). Propodeal dorsum with conspicuous longitudinal ridges from base to apex, between ridges with inconspicuous short transverse carinae forming reticulate pattern (Fig. 5E); posterior surface with median sulcus narrowing from base to apex, internally extremely narrow; posterolaterally with densely transverse ridges (Fig. 5E); lateral surface of propodeum with irregular oblique carinae, internal oblique carinae with few inconspicuous short ridges (Fig. 5F).

Wings. Recurrent vein with stub of vein just before its junction with submarginal cell (Fig. 5G).

Metasoma. Metasoma spindly; terga polished, terga I and II sparsely, finely punctate; remaining terga finely coriaceous. Sternum I with keeled projection, laterally to keel without conspicuous ridges. Basal third of sternum II with deep transverse groove, groove surface coriaceous.

Male. Unknown.

Distribution. China (Yunnan).

Etymology. The specific epithet *tumidiscuta* combines the Latin "*tumid-*" and "*scuta*", referring to the conspicuously convex mesonotum of this species.

***Nitela vecarinata* sp. nov.**

https://zoobank.org/E20CDE25-1018-4A12-BFA8-8D0184388DA4

Fig. 6

Type material. ***Holotype.*** ♀, China • **Yunnan**, Wenshan, Malipo Country, Liuhe Township, 23.3175°N, 104.8989°E, 2017.IV.22–V.3, Yanqiong Peng collector.

Paratypes. • 1♀, **Guangdong**, Guangzhou, Haitzu National Wetland Park, 23.0603°N, 113.3369°E, 2021.V.24–VII.9, Fei Ye collector; • 1♀, Shaoguan, Nanling National Forest Park, 24.9175°N, 113.0828°E, 2020.X.4–19, Fei Ye collector; • 1♀, Shenzhen, Shenzhen Fairy Lake Botanical Garden, 22.5775°N, 114.1825°E, 2020.I.6–III.3, Jianwei Li collector; • 5♀, Zhaoqing, Dinghu Mountain National Nature Reserve, 22.5775°N, 114.1825°E, 2021.V.10–25 (2♀); 2021.V.25–VI.9 (1♀); 2021.IX.9–X.9 (3♀), Fei Ye collector.

Diagnosis. This species is closely similar to *N. yasumatsui taiwana* Tsuneki, 1982 in having frons with coarsely, irregular reticulate ridges; basal half of mesoscutum coarsely, densely, irregularly rugose; posterior half of mesoscutum with abundant long longitudinal wrinkles. It differs by the following characteristics (characters of *N. yasumatsui taiwana* in parentheses): propodeal dorsum with straight, longitudinal ridges from base to apex, interconnected by conspicuous, short, transverse carinae forming reticulate pattern (propodeal dorsal surface with curved oblique ridges without conspicuous short transverse carinae, not reticulate); submarginal cell length approximately equal to discal cell (discal cell longer than submarginal cell); mesoscutellum with conspicuous longitudinal carinae (mesoscutellum without longitudinal carina).

Description of female. Body length 3.9–4.3 mm. Body black. Mandible basally dark brown, apex yellowish-brown; maxillary palpus and labial palpus pale yellow; Antennal base and outer margin dark brown; stigma and tegula dark brown; wing veins yellowish-brown; apical margin of gastral terga yellowish-brown; trochanters and tibiae yellowish-brown, tarsi pale yellow; mid and hind coxae apically yellowish-brown. Body covered with silvery pubescence.

Head. Inner margin of mandible subapically with one tooth. Clypeus conspicuously convex medially; with complete midclypeal carina slightly surpassing frontoclypeal sulcus; anterior margin of clypeus with triangular smooth area, slightly concave medially (Fig. 6B). Frons coarsely, irregular reticulation, swelling medially, depressed laterally;

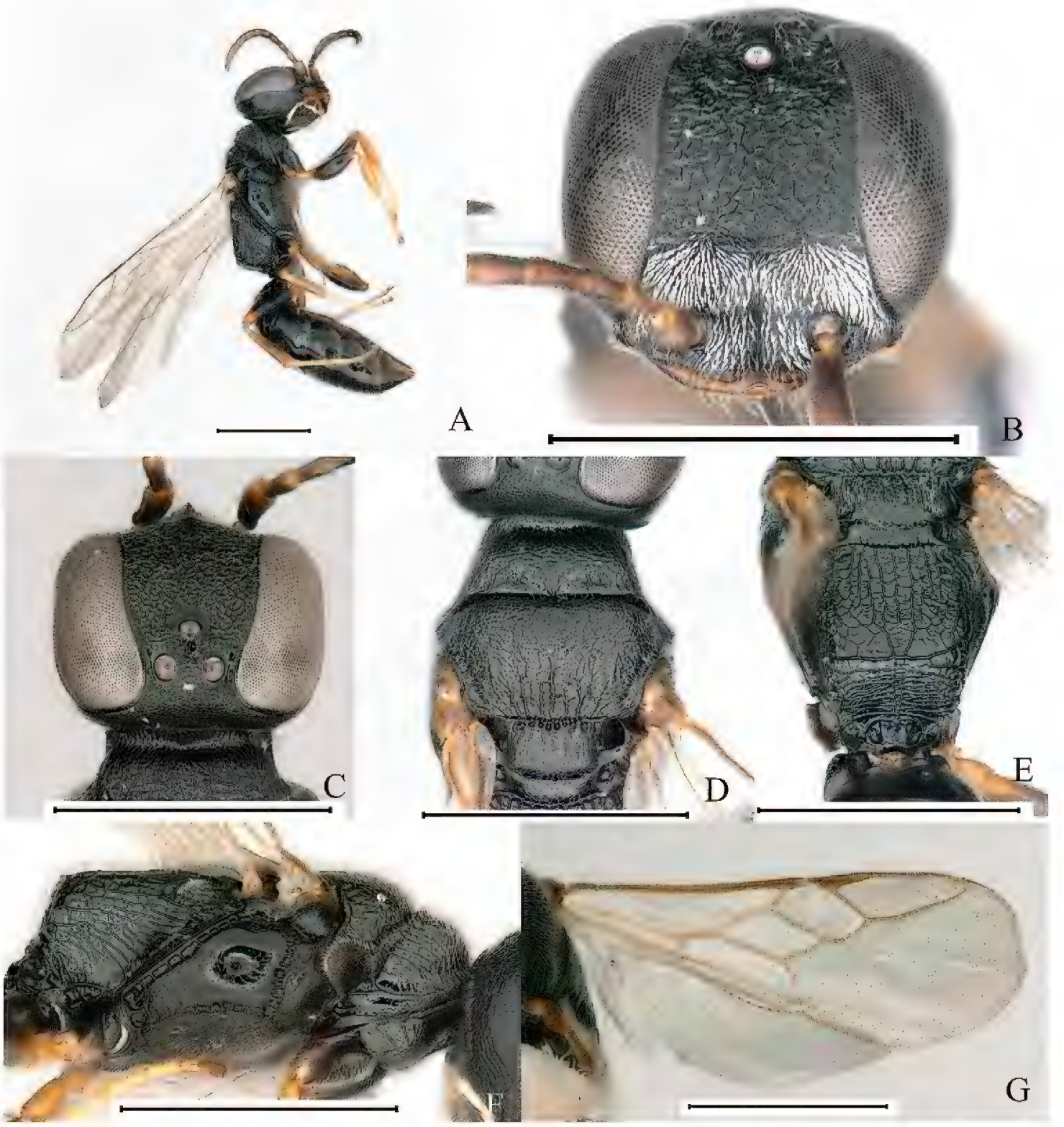

Figure 6. *Nitela vecarinata* sp. nov. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

frontal concavity shallow (Fig. 6B). Ocellar triangle finely punctate and rugose (Fig. 6C). Gena densely, finely punctate, with long transverse striations. Vertex with transverse ridges (Fig. 6C). Eyes converging above; OOD: POD: ODD = 2: 6: 5 (Fig. 6C). Flagellomere I approximately as long as pedicel.

Mesosoma. Pronotal collar stepped, without conspicuous transverse groove or with shallow transverse groove, with short longitudinal ridges; anterolateral angle rounded; anterior carina absent (Fig. 6D). Mesoscutum slightly convex; basal median area of mesoscutum without short longitudinal ridges; basal half coarsely, densely, irregularly rugose; posterior half with abundant long longitudinal wrinkles bifurcating at middle of mesoscutum; scutal lateral sulcus crenulate, inner margin sharply defined, internal

transverse ridges slightly exceeding border (Fig. 6D). Mesoscutellum with median carina flanked by several longitudinal carinae; anterior margin crenulate (Fig. 6D). Mesopleuron uniformly punctate except episcrobal area (Fig. 6F) smooth, polished; central circular depression sparsely, finely punctate (Fig. 6F); episternal sulcus normal, crenulate, internal longitudinal ridges not exceeding lateral margin; hypersternaulus narrow, deeply crenulate. Mesosternum densely, finely punctate (Fig. 6F). Metanotum sparsely punctate (Fig. 6D). Metapleuron inconspicuously separated from propodeal lateral surface; dorsally smooth, without carina (Fig. 6F). Propodeal dorsum with longitudinal ridges from base to apex, between ridges with short transverse carinae forming reticulate pattern (Fig. 6E); posterior surface with median sulcus narrowing from base to apex, forming subtriangular zone, internally with transverse ridges; posterolaterally with irregular transverse ridges (Fig. 6E); lateral surface of propodeum with irregular oblique carinae (Fig. 6F).

Wings. Recurrent vein with stub of vein just before its junction with submarginal cell (Fig. 6G).

Metasoma. Metasoma spindly; terga polished, terga I sparsely, finely punctate, between punctures coriaceous. Remaining terga densely, finely punctate basally, remaining areas sparsely punctate, areasbetween punctures coriaceous. Tergum III and subsequent terga densely, finely punctate. Sternum I with keeled projection, laterally to keel with small punctures. Basal third of sternum II with deep transverse groove, groove surface coriaceous.

Male. Unknown.

Distribution. China (Guangdong, Yunnan).

Etymology. The specific epithet *vecarinata* is derived from the Latin prefix "*ve-*" and the Latin word "*carinata*", referring to the absence of a conspicuous anterior marginal carina on the pronotal collar of this species.

New records from China

***Nitela domestica* (F. Williams), 1928**
Fig. 7

Rhinonitela domestica F. Williams, 1928.
Tenila domestica: Baltazar, 1966: 327.
Nitela domestica: Menke, 1968: 137.

Material examined. 1♀, **China • Hainan**, Qiongzhong, Limu Mountain, 19.1781°N, 109.7691°E, 2020 IX.30–X.31, Longlong Chen collector.

Remark. The descriptions of *Nitela domestica* (Williams, 1928) in Economic Insect Fauna of China and Hymenoptera of Zhejiang align with the characteristics of *N. collaris* R. Turner, 1926, rather than those of *N. domestica* (Williams, 1928). Therefore, *N. domestica* (Williams, 1928) mentioned in these works should be corrected to *N. collaris* R. Turner, 1926. Prior to this study, no specimens of *domestica* had been discovered or recorded in China. The specimens identified in this study represent the first record of this species in China.

Distribution. China (Hainan), Philippines.

Figure 7. *Nitela domestica* (F. Williams), 1928. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

Nitela rugosa Williams, 1928

Fig. 8

Nitela rugosa Williams, 1928: 95.

Material examined. 2♀, China • **Hainan**, Lingshui Country, Diaoluo Mountain, 19.0778°N, 109.4144°E, 2010.VII.12–13 (1♀), 2021.II.28–III.31 (1♀), Longlong Chen collector; • 1♀, **Yunnan**, Xishuangbanna, Mengla Country, Xishuangbanna Tropical Botanical Garden, rubber plantation, 21.9197°N, 101.2778°E, 2020.VII.14–VIII.14, Ling Zhao collector.

Distribution. China (Hainan, Yunnan), Philippines.

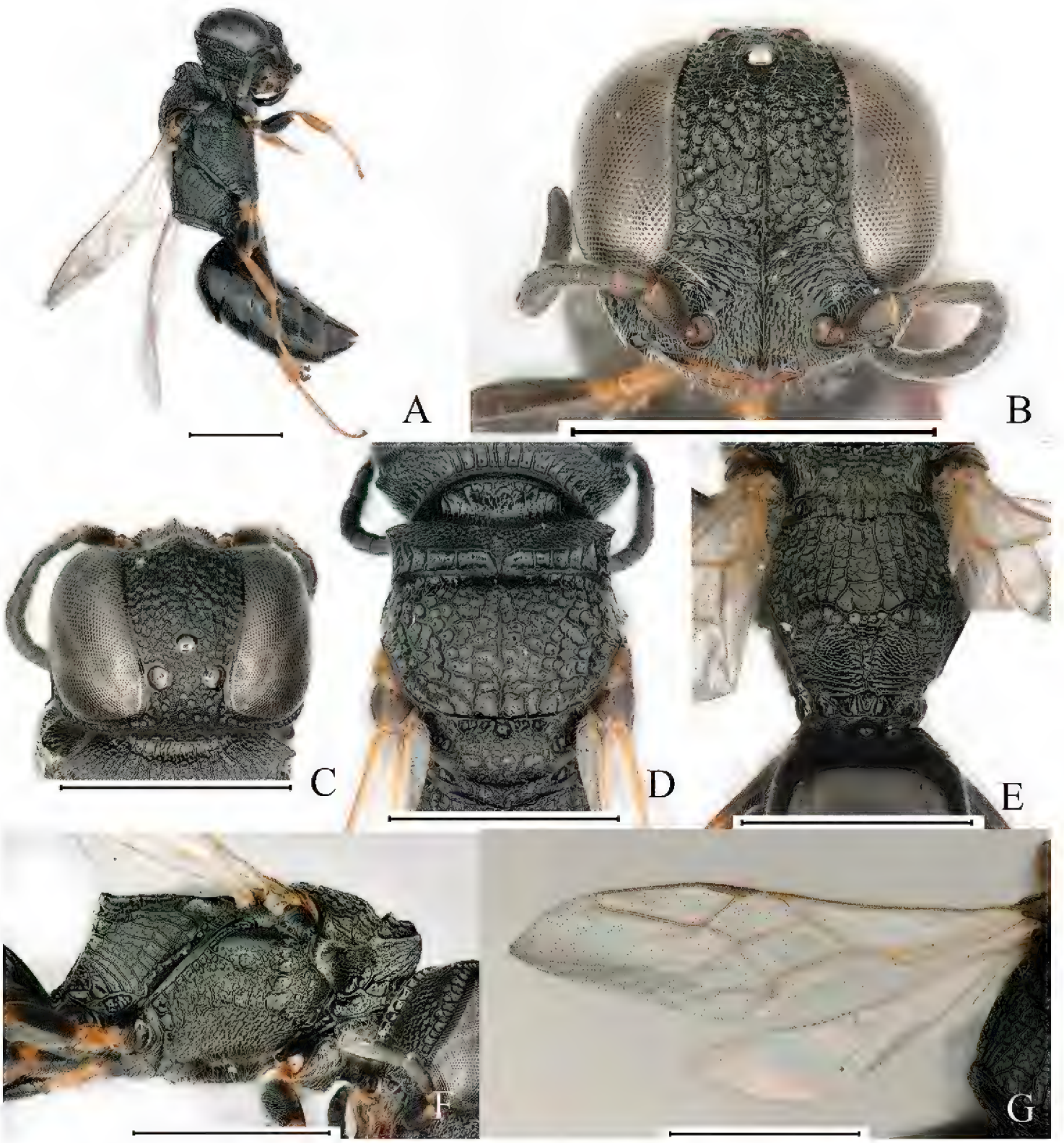

Figure 8. *Nitela rugosa* F. Williams, 1928. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

Nitela williamsi Menke, 1968

Fig. 9

Nitela williamsi Menke, 1968: 134.

Material examined. 1♀, China • **Hainan**, Lingshui Country, Diaoluo Mountain, 19.0778°N, 109.4144°E, 2019.VI.4–20, Longlong Chen collector; • 1♀, Danzhou, Hainan Tropical Botanical Garden, rubber plantation, 18.7289°N, 109.8303°E, 2019.XI.30–XII.30, Longlong Chen collector; • 2♀, **Guangdong**,

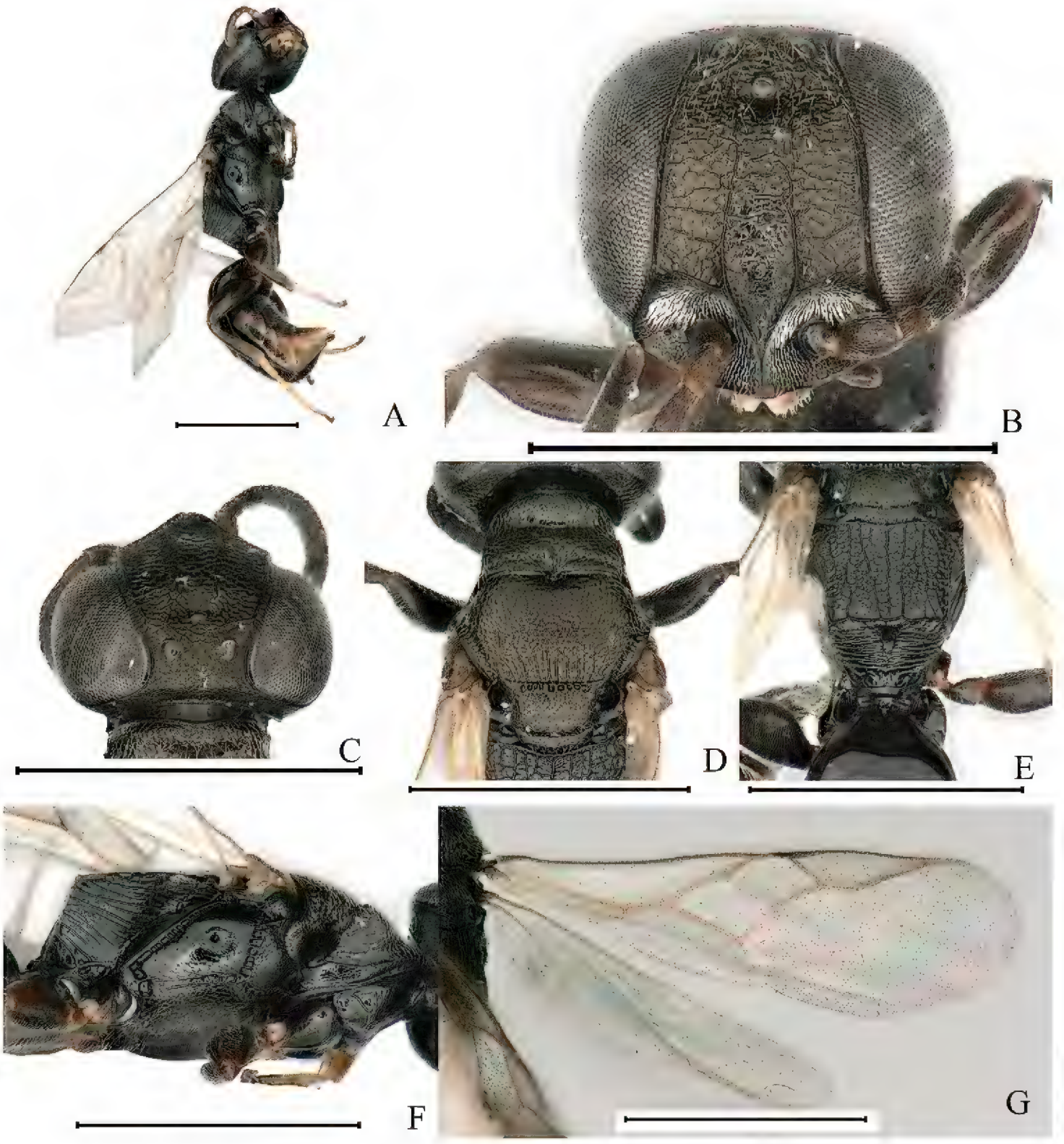

Figure 9. *Nitela williamsi* Menke, 1968. Female. Holotype **A** habitus, lateral view **B** head, frontal view **C** head, dorsal view **D** pronotum, scutum and scutellum, dorsal view **E** propodeum, dorso-posterior view **F** thorax, lateral view **G** fore and hind wings. Scale bars: 1.0 mm.

Xinyi, Yunkai Mountain, 122.4789°N, 111.2600°E, 2020.IV.30–V.30 (1♀), 2020. VII.23–VIII.31 (1♀) , Longlong Chen collector; • 1♀, **Yunnan**, Jinghong, Menghai Country, Bulang Mountain, 21.6267°N, 100.4064°E, 2021.X.15–XI.18,. Ling Zhao collector; • 1♀, Xishuangbanna, Mengla Country, Xishuangbanna Tropical Botanical Garden, rubber plantation, 21.9197°N, 101.2778°E, 2018.V.15–VI.18, Ling Zhao collector.

Distribution. China (Guangdong, Hainan, Yunnan), Malaysia.

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References

Ahrens LE (1949) K biologii i sistematicheskomu polozheniyu *Nitela* Latreille i drugikh predstaviteley Miscophinae (Hymenoptera, Sphecidae) [= К биологии и систематическому положению *Nitela* Latreille и других представителей Miscophinae = On the biology and systematic position of *Nitela* and other Miscophinae (Hymenoptera, Sphecidae)]. Doklady Akademii Nauk SSSR (Novaya Seriya) 68: 413–415.

Allen GW (1987) A field note on *Nitela* borealis (Hymenoptera: Sphecidae). The Bulletin of the Kent Field Club 32: 28.

Arnold G (1929) The Sphegidae of South Africa. Part XIV. Annals of the Transvaal Museum 13: 381–418 [pls. VII–VIII].

Arnold G (1940) New species of African Hymenoptera No. 4. Annals of the Transvaal Museum 20: 101–143 [pl. V].

Arnold, G (1947) New species of African Hymenoptera. No. 7. Occasional Papers of the National Museum of Southern Rhodesia (13): 131–167. [Sphecidae] http://www.antwiki.org/wiki/images/6/67/Arnold_1947.pdf

Baltazar CR (1966) Catalogue of Philippine Hymenoptera (With a Bibliography, 1758–1963). Pacific Insect Monographs 8: 1–488.

Banaszak J (1977) Błonkówki (Hymenoptera) spotykane na dębach rogalińskich [= Hymenoptera found on the oaks in Rogalin, Poland]. Badania Fizjograficzne nad Polską Zachodnią, Seria C 30: 109–115.

Bohart RM, Menke AS (1976) Sphecid wasps of the world, A generic revision. University of California Press, Berkeley, Los Angeles, London. 695 pp. https://doi.org/10.1525/9780520309548

Brauns H. (1911) Die südafrikanischen Nitela-Arten und zwei Nitela-Arten aus Zentralamerika. Verhandlungen der kaiserlich-königlichen Zoologisch-Botanischen Gesellschaft in Wien 61: 139–143.

Brèthes J (1913) Himenópteros de la América Meridional. Anales del Museo Nacional de Historia Natural de Buenos Aires 24: 35–165.

Ducke A (1903) Neue Grabwespen vom Gebiete des unteren Amazonas. Verhandlungen der kaiserlich-königlichen Zoologisch-Botanischen Gesellschaft in Wien 53: 265–270.

Ducke A (1908) Contribution à la connaissance de la faune hyménoptèrologique du Nord-Est du Brésil. II. Hyménoptères récoltés dans l'Etat de Ceara en 1908. Revue d'Entomologie publiée par la Société Française d'Entomologie, Caen 27: 57–87.

Fresno F (2018) Nuevos datos para conocimiento de la distribución de Apoidea Spheciformes en España (Hymenoptera: Sphecidae y Crabronidae) – New records for the knowledge of the distribution of Apoidea Spheciformes in Spain (Hymenoptera: Sphecidae and Crabronidae). Revista Gaditana de Entomología 9: 225–236.

Gayubo SF (1984) Aportación al conocimiento de los esfécidos de El Algarve (Portugal) (Hym., Sphecidae). Boletim da Sociedad Portuguesa de Entomologia 2: 349–387.

Gayubo SF, Felton JC (2000) The European species of the genus *Nitela* Latreille, 1809 (Hymenoptera: Sphecidae). Annales de la Société Entomologique de France (Nouvelle Série) 36: 291–313.

Gayubo SF, Schmid-Egger Ch (2014) Order Hymenoptera, family Crabronidae, genus *Nitela* Latreille, 1809. Arthropod fauna of the United Arab Emirates 5: 640–648.

Gussakovskij VV (1945) Interesnaya novinka fauny Sphecidae Sredney Azii [= Интересная новинка фауны Sphecidae Средней Азии] – Generis Nitela (Hymenoptera, Sphecidae) species nova ex Asia Media. Éntomologicheskoye Obozreniye (= Revue d'Entomologie de l'URSS) 28: 35–37.

Haeseler V (1978) Zum Auftreten aculeater Hymenopteren in gestörten Hochmoorresten des Fintlandsmoores bei Oldenburg. Drosera. Naturkundliche Mitteilungen aus Nordwestdeutschland 78: 57–76.

Jacob-Remacle A, Leclercq J (1980) Hyménoptères Aculéates piégés dans trois jardins de Liège «intra muros». Bulletin de la Société Royale des Sciences de Liège 49: 186–198.

Japoshvili G, Ljubomirov T (2022) Wasps of the families Ampulicidae, Bembicidae, Bethylidae, Chrysididae, Crabronidae, Evanidae [sic], Gasteruptidae [sic], Heloridae, Pemphredonidae, Pompilidae, Psenidae, Sphecidae and Vespidae (Hymenoptera) of Lagodekhi protected areas, from Georgia (Sakartvelo). Annals of Agrarian Science 19: 269–287.

Kaplan E, Yildirim Y (2023) A review of Spheciformes (Hymenoptera) of Turkey, with history of their research. Munis Entomology & Zoology 18: 1675–1710.

Kazenas VL (1978) Royushchiye osy Kazakhstana i Sredney Azii (Hymenoptera, Sphecidae). Opredelitel' [= Роющие осы Казахстана и Средней Азии. Определитель] – The digger wasps of Kazakhstan and Middle Asia (Hymenoptera, Sphecidae). The determinant. Izdatel'stvo Nauka Kazakhskoy SSR, Alma Ata, 172 pp. http://www.antvid.org/Kazenas/PDF/Publ/1978%20Sphecidae%20Kaz.%20and%20C.Asia,%20key%20(Kazenas,1978).pdf

Kazenas VL (2001) Fauna i biologiya royushchikh os (Hymenoptera, Sphecidae) Kazakhstana i Sredney Azii [= Фауна и биология роющих ос Казахстана и Средней Азии = Fauna and biology of sphecid wasps (Hymenoptera, Sphecidae) of Kazakhstan and Central Asia]. Kazgos INTI, Almaty. 333 pp. http://archive.org/search.phpquery=Kazenas

Kohl FF (1884) Neue Hymenopteren in den Sammlungen des k. k. zool. Hof-Cabinetes zu Wien. II. Verhandlungen der kaiserlich-königlichen Zoologisch-Botanischen Gesellschaft in Wien 33: 331–386 [pls. XVIIa-XVIII]. https://doi.org/10.5962/bhl.part.25327

Krombein KV (1950) A new Nitela from California (Hymenoptera, Sphecidae). The Pan-Pacific Entomologist 26: 130–131.

Krombein KV (1968) A fifth species of Nitela from North America (Hymenoptera: Sphecidae). Le Naturaliste Canadien 95: 699–702.

Latreille PA (1809) Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimis explicata. Amand Koenig, Parisiis et Argentorati [= Paris and Strasbourg]. Tomus quartus et ultimus, 399 pp.

Lefeber V (1975) De Aculeaten (bijen en wespen) van de Schiepersberg. Natuurhistorisch Maandblad 64: 106–111, 117–122, 153–156.

Li T, Li Q (2010) Key to the Oriental species of *Nitela* Latreille (Hymenoptera: Crabronidae), with descriptions of two new species from China. Oriental Insects 44: 337–344. https://doi.org/10.1080/00305316.2010.10417620

Ljubomirov T (2008) Digger wasp fauna (Insecta, Hymenoptera, Sphecidae, Crabronidae) of la Palma (Canary Islands) - a survey with description of a new species – La fauna de Crabronidae y Sphecidae (Insecta, Hymenoptera) de la isla de La Palma (isles Canarias - una aproximación que incluye la descripción de une especie nueva). Graellsia 64: 255–264. https://doi.org/10.3989/graellsia.2008.v64.i2.35

Lomholdt O (1975) Bemærkninger til faunaen af gravehvepse på Anholt (Hymenoptera aculeata, Sphecidae). Flora og Fauna 81: 31–34.

Lomholdt O (1985) A reclassification of the Larrine tribes with a revision of the Miscophini of southern Africa and Madagascar (Hymenoptera: Sphecidae). Entomologica Scandinavica 24(Supplement): 1–183.

Maidl F (1925) Fauna sumatrensis. (Beitrag Nr. 11). Sphegidae (Hym.). Entomologische Mitteilungen 14: 376–390.

Maneval H (1929) Notes sur quelques Hyménoptères. Annales de la Société Entomologique de France 98: 289–300.

Menke AS (1968) Two new species of *Nitela* with taxonomic notes on the taxa *Tenila*, *Rhinonitela*, and *Nitela rugosa*. Mushi 42: 133–139.

Menke AS (1969) A new *Nitela*, subgenus *Tenila*, with a key to the species of the subgenus (Hymenoptera: Sphecidae). Proceedings of the Entomological Society of Washington 71: 197–201. http://biodiversitylibrary.org/page/16277701

Pankov GI (2013) Royushchiye osy Ivanovskoy oblasti [= Роющие осы Ивановской области = Digger wasps of Ivanovsk Oblast', Russia]. Krayevedcheskiye Zapiski (Ivanovo) 14: 226–232.

Pate VSL (1937) The third Neartic [sic] species of *Nitela*, with remarks on the genera Tenila Brèthes and Rhinonitela Williams (Hymenoptera: Sphecidae). Bulletin of the Brooklyn Entomological Society 32: 5–7.

Pulawski WJ (2010) *Nitela constructor*, a new species from French Guiana (Hymenoptera: Crabronidae). Proceedings of the California Academy of Sciences (Fourth Series) 61: 381–383.

Schmid-Egger Ch, van Harten A (2022) Additions to the digger wasps (Hymenoptera, Spheciformes) of the United Arab Emirates with description of ten new species. Zootaxa 5219: 543–575. https://doi.org/10.11646/zootaxa.5219.6.3

Shlyakhtenok AS (1996) O zhalonosnykh pereponchatokrylykh (Hymenoptera, Aculeata) verkhovogo bolota. Semeystva Pompilidae, Vespidae, Eumenidae, Sphecidae [= О жалоносных перепончатокрылых (Hymenoptera, Aculeata) верхового болота. Семейства Pompili-

dae, Vespidae, Eumenidae, Sphecidae = Aculeata of a bog in Berezinsky Nature Reserve, Belorussia]. Ékologiya 1996 (4): 302–306. http://shlyakhtenok.narod.ru/ekologie96.pdf

Tsuneki K (1956) Two new species of the genus *Nitela* in Japan (Hymen., Sphecidae, Larrinae). Akitu 5: 33–35.

Tsuneki K (1982) Sphecidae from North Korea (II) with the list of the species of the family known from the Korean Peninsula (Hymenoptera). Special Publications of the Japan Hymenopterists Association 20: 1–22.

Tsuneki K, Nozaka C, Tano T, Kurokawa H, Murota T (1992) Studies on the Philippine Sphecoidea (Hymenoptera). II. Special Publications of the Japan Hymenopterists Association 39: 1–48.

Turner RE (1908) Notes on the Australian fossorial wasps of the family Sphegidae, with descriptions of new species. Proceedings of the General Meetings for Scientific Business of the Zoological Society of London 1908: 457–535 [pl. XXVI]. https://doi.org/10.1111/j.1469-7998.1908.tb07388.x

Turner RE (1916) Notes on fossorial Hymenoptera. – XXIII. On some Australian genera. The Annals and Magazine of Natural History (Series 8) 18: 277–288. https://doi.org/10.1080/00222931608693849

Turner RE (1926) New Sphegidae from the Malay Peninsula. Journal of the Federated Malay States Museum 13: 199–202.

Valkeila E (1974) *Nitela spinolai* Latr. s. auct. (Hym., Sphecoidea, Larridae): A confusion of two European species. Annales Entomologici Fennici 40: 75–85. [includes a key to European species and description of larva].

van Zuijlen JWA (1994) The amazonica species group of the genus *Nitela* Latreille (Hymenoptera: Sphecidae: Crabroninae). Zoologische Mededelingen (Leiden) 68: 249–269.

Vikberg V (1986) A checklist of aculeate Hymenoptera of Finland (Hymenoptera, Apocrita Aculeata). Notulae Entomologicae 66: 65–85.

Vincens F (1910) Observations sur les moeurs et l'instinct d'un insecte hyménoptère Le *Nitela* Spinolai Latr. Bulletin de la Société d'Histoire Naturelle et des Sciences Biologiques et Énergétiques de Toulouse 43: 11–18.

Voblenko AS, Gorobchishin VA, Nesterov MA (1996) Digger wasps (Hymenoptera, Sphecidae) of Ukrainian Polesye. Sphecos 30: 14–15.

Williams FX (1928) Studies in tropical wasps – their hosts and associates (with descriptions of new species). Bulletin. Reports of Work of the Experiment Station of the Hawaiian Sugar Planters' Association. Entomological Series 19: 1–179.

Williams FX (1945) The aculeate wasps of New Caledonia, with natural history notes. Proceedings of the Hawaiian Entomological Society 12: 407–452.